VILLANOVA UNIVERSITY
College of Liberal Arts and Sciences

CSC 1051 – 100

Algorithms & Data Structures I

Fall 2021 | Mendel Hall G88 | Mondays & Wednesdays | 6:00 PM – 7:50 PM

Mohamed Alie Pussah II

+1 267 357 6840 (Text Only)

mpussah@villanova.edu (~48hrs response)

Office Hours:

Mondays & Wednesdays

4 PM – 5:30 PM | Adjunct Lounge

Course Description

Object-oriented design: objects, classes, methods, encapsulation; programming fundamentals: data, variables, selection, loops, arrays, input/output; exceptions.

This course offers you an opportunity to learn the fundamental concepts of writing a computer program, using a computer programming language. It introduces a new way to think about problems. It gives you tools that mirror real world problems with programmatic environments.

Objectives

By the end of this course, you are expected to develop skills in the following topics:

1. Programming concepts
2. Programming languages
3. Object Oriented Programming Languages
4. Principle of Object-Oriented Programming design
5. Classes
6. Methods
7. Data
8. Variables
9. Statements
10. Expressions
11. Loops
12. Arrays
13. Input/output
14. Exception

Required Text

Java Software Solutions, 9th edition

Required Software/Hardware

OS: Windows | Mac OS | Linux
Code Editor: Visual Studio Code
SDK: Java Development Kit

Course Requirement

Projects (80%)
Quizzes (20%)

Grading Scale

Letter	A	A-	B+	B	B-	C+	C	C-	D+	D	D-
Grade	95	90	87	84	80	77	74	70	67	64	60

Course Outline

Week #		Assigned Reading	Assigned Work
1 (08/30/2021)	Getting Started ➢ The Java Programming Language ➢ Hello, World ➢ Compiling and Executing ➢ The print and println Methods ➢ Programming Errors ➢ The Java API ➢ Comments	Week 1 (Rephactor)	Review Week 1 Quick Check
2 (09/06/2021)	Managing Data ➢ Variables ➢ Primitive Data Types ➢ Assignment Statements ➢ Constants	Week 2 (Rephactor)	Review Week 2 Quick Check
3 (09/13/2021)	Managing Data Continued ➢ Numeric Expressions ➢ Shortcut Assignment Operators ➢ The Math Class ➢ The `printf` Method ➢ The Scanner Class (slides)	Week 3 (Rephactor)	Review Week 3 Quick Check
4	Working with Strings ➢ Strings ➢ Escape Sequences ➢ The Unicode Character Set ➢ The import Statement ➢ Creating Objects ➢ Random Numbers	Week 4 (Rephactor)	Review Week 4 Quick Check

5	Object Oriented Programming ➢ Objects and Classes ➢ Class Anatomy ➢ Example: Card ➢ Example: Person ➢ Encapsulation	Week 5 (Rephactor)	Review Week 5 Quick Check
6	More About Objects ➢ Example: Dice ➢ Example: Bank Account ➢ The `this` Reference ➢ Object Equality ➢ The `compareTo()` Method	Week 6 (Rephactor)	Review Week 6 Quick Check
7	Making Decisions ➢ The if Statement ➢ Boolean Expressions ➢ Boolean Operators ➢ The switch Statement ➢ Program Style ➢ Flow of Control ➢ Conditional Expressions	Week 7 (Rephactor)	Review Week 7 Quick Check
8	Repetition ➢ The `while` Statement ➢ Example: The High-Low Game ➢ Example: Palindromes ➢ The `do-while` Statement ➢ The `for` Statement Introduction to Methods ➢ Method Anatomy ➢ Method Overloading ➢ Reading and Writing Text Files	Week 8 (Rephactor)	Review Week 8 Quick Check
9	Working with Collections ➢ Collections Overview ➢ Lists ➢ Example: Deck of Cards	Week 9 (Rephactor)	Review Week 9 Quick Check

	➢ Maps ➢ Wrapper Classes ➢ The `for-each` Statement		
10	Working with Arrays ➢ Arrays ➢ Binary Search ➢ Example: Prime Sieve ➢ Common Array Algorithms ➢ Example: Standard Deviation ➢ Arrays of Objects	Week 10 (Rephactor)	Review Week 10 Quick Check
11	# More with Arrays ➢ Two-Dimensional Arrays Interfaces and Inheritance ➢ Interfaces ➢ The Comparable Interface ➢ Inheritance	Week 11 (Rephactor)	Review Week 11 Quick Check
12	Graphics and Graphical User Interfaces (GUI) ➢ Introduction to JavaFX ➢ Basic Shapes ➢ Representing Color ➢ Text and Fonts ➢ Event Handlers ➢ Buttons For reference: Predefined Colors (optional)	Week 12 (Rephactor)	Review Week 12 Quick Check
13	More Graphics and GUIs ➢ Images ➢ Check Boxes ➢ Radio Buttons ➢ Mouse Events ➢ Arcs ➢ Polygons and Polylines ➢ Transformations		

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Attendance Policy

You are adults. As such, I will not be enforcing any kind of attendance policy. You will be held responsible for the content of the class as denoted in the course outline above. Having said that, if you missed class, I am available to you for any questions you may have, provided you have read the course material as indicated in the outline above.

Late Assignment

You are required to submit your projects on the specified date and time. If you miss a project deadline, you have a grace period of up to 1 course week, after the deadline. After that, your project would not be accepted, even if it were completed.

Extra Credit

There will be no extra credit. However, if you feel you are above the content of the class, I will afford you an opportunity to test out of the class. This means I will test you on the topics the class is expected to cover. If you attain a passing grade, you have the option to retain that grade and be excused from the class for the rest of the semester.

Quizzes

There will be a total of 14 quizzes. Each quiz will be a short programming exercise, usually 1 or 2 questions, and very short. A quiz will follow the completion of each Week. So, expect at least 1 quiz at the beginning of every week, following the first week. The quiz is meant to prepare you for the projects. Quizzes are graded on a 0%-100% grading scale.

Projects

There will be a total of 4 projects. Each project will build on the previous one, as the result of all the projects will be a complete program. You will develop your projects based on the skills you acquire over the course of the semester. When you submit a project, you are expected to retain the original code, as you will be expected to continue where you left off for the next project. Projects are graded on a 0%-100% scale.

Code Submission Policy

This is very important! Any code you submit must be free of compile-time errors. As you will learn, this means your code must run. If your code fails to run, you will earn 0% for that quiz or project. If your code runs, but the logic is incorrect or doesn't behave as expected, you will still earn some points. Only non-runnable code will earn an automatic 0%. **Please remember this! It is very important that your code runs!**

Office of Disabilities (ODS) and Learning Support Services (LSS)

It is the policy of Villanova to make reasonable academic accommodations for qualified individuals with disabilities. Go to the Learning Support Services website http://learningsupportservices.villanova.edu for registration guidelines and instructions. For physical access or temporarily disabling conditions, please contact the Office of Disability Services at **610-519-3209 or 610-519-4095**, or email ods@villanova.edu. Registration is needed in order to receive accommodations.

Academic Integrity

All students are expected to uphold Villanova's Academic Integrity Policy and Code. Any incident of academic dishonesty will typically result in an "F" for the assignment and will be reported to the appropriate university officials. See the statement of the full policy on the Graduate Arts and Sciences website. You can view the Academic Integrity Policy and Code, as well as other useful information related to writing papers, at the Academic Integrity Gateway web site: https://library.villanova.edu/research/subject-guides/academicintegrity.

Absences for Religious Holidays

Villanova University makes every reasonable effort to allow members of the community to observe their religious holidays, consistent with the University's obligations, responsibilities, and policies. Students who expect to miss a class or assignment due to the observance of a religious holiday should discuss the matter with their professors as soon as possible, normally at least two weeks in advance. Absence from classes or examinations for religious reasons does not relieve students from responsibility for any part of the course work required during the absence. https://www1.villanova.edu/villanova/provost/resources/student/policies/religiousholidays.html.